REMARKS

Claims 1, 3-5, 9, 12-16 and 18-21 are rejected under 35 USC 112, first paragraph for lack of enablement in the specification. The Examiner in particular questions whether the full scope of the invention is enabled for unexpected results or synergism.

Reconsideration is requested in view of the following and the additional evidence annexed hereto in the form of a DECLARATION.

Applicants respectfully traverse the conclusion by the Examiner that the scope of claim 1 is too broad or unsupported. Claim 1 is not unrestricted as to biopenetrants and mixture ratios. Claim 1 is restricted to biopenetrants (originally defined in original claims 9 and 12) which are polymers or copolymers having a plurality of quaternary ammonium groups, an alkyl benzene or alkyl naphthalene sulphonate having less than 5 aliphatic carbon atoms and/or phosphono polycarboxylic acid. Claims 3 and 4 further define the type of biopenetrant. Similarly, claims 18-21 closely define the biopenetrant. It is therefore submitted that persons of ordinary skill in the art will have no trouble selecting appropriate biopenetrants.

The amount of biopenetrant is also defined in claim 1. The claimed combination is a unique combination of agents, as is discussed below. The Examiner questions "synergistic" mixtures

and how to select one. The Examiner's rejection is based on a generalized interpretation of the meaning of synergy. However, the term "synergy" as used here is synergy between the function of the class of biopenetrant and the other component(s) in the mixture not the specific biopenetrant.

More specifically, the claims relate to the synergy which arises when THP and certain non-surfactant biopenetrants as defined in the claims are used in combination for killing microorganisms protected by a hydrophobic outer layer. Previously surfactants were the only compounds known to promote the penetration of hydrophobic layers by THP. However, surfactants are generally of limited effectiveness and when sufficient quantities are used, they cause unacceptable foaming problems in water treatment. The invention provides novel synergistic compositions which act as biopenetrants without causing foam problems. Thus, it is submitted that persons of ordinary skill in the art would be able to select appropriate amounts to practice the claimed invention.

Further concerning enablement and synergism, annexed hereto is a DECLARATION by C.R. Jones discussing evidence of enablement and synergism for the full range of the presently claimed invention. This is in addition to the evidence in the specification Example 1 and its associated Table (THPS/WSCP compared with prior-known formulations).

The claims are rejected over Davis et al. (GB 2 145 708) in combination with a number of secondary references each of which is discussed in the DECLARATION annexed hereto.

In general, the secondary references, although they teach the use of various compounds do not relate to the use of a THP salt or THP condensate, alone or in a combination, for the disinfection of water (please see detailed discussion in the DECLARATION).

Davis (EP 0 491 391) the primary reference, relates to a method of making phosphono-carboxylic acids and to their use in water disinfection. It does not relate to THP salts or THP condensates.

Davis et al. refers to a synergy between two known biocides, THP and the thiocyanate biocides, such as TCMTB. This is not a teaching of a combination of THP and a biopenetrant. TCMTB is not a biopenetrant.

As discussed in detail in the enclosed DECLARATION, there is no teaching of the use of THP and a "biopenetrant" in Davis et al. Thus, it is not obvious to substitute compounds of the secondary references for compounds in Davis et al. The present invention is, therefore, not obvious.

Withdrawal of the rejections and allowance of the application are therefore respectfully requested.

Respectfully submitted,

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Enc. Executed DECLARATION of Christopher Raymond JONES dated December 6, 2002

MARKED-UP VERSION OF AMENDED CLAIMS

MARKED UP VERSION OF AMENDED CLAIMS SN 09/582,152

18. (Amended) A method for treating aqueous systems to prevent, inhibit or remove microbial contamination, which comprises adding thereto, together or separately, the biocidally synergistic mixture comprising THP, at least one THP-compatible non-surfactant biopenetrant and, optionally, a surfactant, wherein said biopenetrant comprises a polymer or copolymer, having a plurality of quaternary ammonium groups, an alkyl benzene or alkyl naphthalene sulphonate having less than 5 aliphatic carbon atoms and/or a [syntan] phosphono polycarboxylic acid and the concentration of THP is from 10 to 75% by weight and the concentration of biopenetrant is from 0.1 to 10% by weight.

#17
#10
2-3-03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

GROUP ART UNIT 1617

Applicant	:	C.R.Jones and R.E.Talbot
Assignee	:	Rhodia Consumer Specialties Limited
Serial No.	:	09/582,152
Filed	:	December 21, 1998
For	:	Biocidal Compositions and Treatments
Examiner	:	San-ming Hui

DECLARATION

Honorable Commissioner of Patents and Trademarks,

Sir,

Christopher Raymond Jones declares as follows:

1. That he is the Christopher Raymond Jones who, together with Robert Eric Talbot, invented the subject matter of the present application.

2. That he has read the Office Action dated 09 April 2002 and GB 2 145 708, WO 91/04668, WO 96/14092, US 4 599 372, US 4 602 011 and EP 0 491 391 cited by the Examiner on the present application.

3. That GB 2 145 708 teaches that certain quaternary phosphonium compounds, including THPS (tetrakis (hydroxymethyl) phosphonium sulphate), are highly effective biocides and can be formulated with other water treatment chemicals. However, no teaching is disclosed for synergistic biocidal formulations and no guidance is provided as to how such formulations could be prepared. In particular, there is not even a suggestion to use THP salts together with polyquaternary ammonium compounds for the production of synergistic biocidal formulations.

4. That WO 91/04668 discloses that combinations of quaternary ammonium and quaternary phosphonium salts, when used in conjunction with copper salts, provide an effective formulation for disinfection applications. However, no teaching is given as to how the combinations disclosed in this cited document would be suitable for use in water treatment applications. To those skilled in the art it would not be obvious to compare disinfectant systems to water treatment applications as the two applications are distinct. These differences are summarised in the table below.

Parameter	Disinfection	Water Treatment
Application level	0.1- 10 % product	Typically 50 – 500 ppm
Application method	Sprayed or wiped onto surfaces. Also used to soak instruments in baths of product.	Pumped into water systems.
Tolerance for foam	High : foam can be beneficial.	Nil in some applications, eg oilfield seawater deaerators. Low foaming is essential in cooling towers.

Target Organisms	Mainly aerobic bacteria, mycobacteria & spores.	Essential to kill both aerobic & anaerobic bacteria, eg Sulphate reducing bacteria. Also need to control algae. NOTE : Bacterial morphology varies between species/types and this affects the performance of biocides
Temperatures	Ambient temperatures. Thermal stability is not an issue.	Anywhere from 5 to 90°C. Thermal stability is an issue.
Stability of product in system water	Not relevant.	It is essential that the formulation survives for several hours in the system water.

Therefore, it is inappropriate and unobvious to compare disinfection and water treatment applications. In fact, the water treatment formulations cited in the present application would not be suitable for use in disinfection applications because they would be ineffective against spores and mycobacteria and would be totally non foaming. Further to this, copper is cited as the key to the efficacy of the invention in WO 91/04668 whereas the disclosure in the application in suit does not require the presence of copper salt. In particular, the presence of copper salt is highly undesirable in water treatment applications as it can result in galvanic corrosion and damage to water cooling towers and other metallic structures.

5. That WO 96/14092 discloses that a synergistic effect can be achieved by applying an oxidising agent in conjunction with a non-oxidising biocide and a surfactant, but does not render such an effect obvious in the composition of the present application. Although this citation discloses ways to enhance the performance of biocides, including THPS, no reference is made to the ability of polyquaternary ammonium compounds to enhance the performance of THPS. There is no disclosure or teaching in this application that would enable somebody skilled in the art to link the use of polyquaternary ammonium compounds to the enhancement of THPS.

6. That US 4 599372 discloses how to produce self inverting, water in oil, polymer emulsions. No teaching shows or suggests that such emulsions will be useful in enhancing biocides and in particular biocidal formulations containing THPS.

7. That US 4 602 011 discloses formulations containing metal chelates of 8-hydroxyquinoline and alkylbenzene sulphonic acids as being effective bactericides and fungicides. There is no disclosure of other anti-microbial compounds or methods of enhancement thereof. Those skilled in the art appreciate that you can only enhance antimicrobial compounds by careful consideration of their modes of action, specific chemistry, target organisms, application areas and compatibility profiles. This is especially true when synergistic formulations are being sought. For example, it is well known that ethylene oxide/propylene oxide block copolymers are highly effective biopenetrants, but they cannot easily be blended with THPS owing to mutual incompatibility, namely that the ionic nature of THPS affects the cloud point and critical micelle concentration of these biopenetrants, resulting in cloudy formulations which will ultimately exhibit phase separation.

US 4 602 011 also discloses that alkylbenzene sulphonates may be affected by a biopenetrant but that formulations thereof will produce large amounts of foam. This effect is not desirable in many of the application areas cited in the present application.

The present application claims synergistic, non-foaming blends of THPS with a polyquaternary ammonium compound. These blends in particular result in quicker kill rates when using THPS. No disclosure or suggestion is made in US 4 602 011 with respect to enhancement of kill rates.

Finally, since THPS has a different mode of action from the antimicrobial compounds (alkylbenzene sulphonates) described in US 4 602 011, those skilled in the art would appreciate that no teaching can be gained from this cited patent as to how its disclosure could be used to enhance THPS or to enhance the action of THPS.

US 4 602 011 cites the use of **anionic foaming surfactants** whereas the present application describes the use of a **cationic non-foaming** polymer to enhance the action of THPS.

8. That EP 0 491 391 discloses a novel way to produce phosphorus-based oligomers and polymers suitable for use as scale and corrosion inhibitors. It discloses that said polymers can be blended with biocides. However, no disclosure or teaching of synergism is made. There is no disclosure within this citation that would enable or suggest to a person skilled in the art to produce formulations of THPS with enhanced activity and in particular no disclosure is made to suggest that blends of THPS with polyquaternary ammonium compounds would be synergistic under water treatment conditions.

9. That Example 1 in the present application demonstrates the efficacy of the invention in controlling planktonic or free swimming bacteria. In this Example blends of THPS with polyquaternary ammonium compounds are compared to an existing, highly effective, commercial formulation sold in the industrial water treatment market as TOLCIDE® PS75M. This commercial formulation is identified as "comparison B" in the tabulated data. TOLCIDE® PS75M contains Dowfax 2A1 as a biopenetrant. Dowfax 2A1 is an anionic surfactant that is widely used as a biopenetrant in water treatment applications. However, Dowfax 2A1 has the disadvantage of foaming.

Example 1 of the present application clearly illustrates the significant and surprising advantage of THP/polyquaternary ammonium blends over "comparison B" at short contact times. For example, 50ppm of the example formulation gave a "total kill" of the bacterial population after a 3 hour contact period. "Comparison B" however, which contained twice as much active biocide, only produced a 3 log cell reduction in bacterial numbers (i.e. 4.5×10^2 bacteria survived) over the same contact time. This clearly shows a very significant, surprising and practical demonstration of a high degree of synergy between THPS and polyquaternary ammonium compounds.

10. That Example 2 of the present application demonstrates the efficacy of the invention in controlling biofouling. The alginate B test is a widely accepted simulated biofilm test method. However, we (Rhodia) now use a more conventional test method to evaluate efficacy of compounds against biofilms and data is submitted below using this method to support Example 2 of the present application.

New Conventional Method

Stainless steel coupons were placed onto agar plates, the agar plates having been previously covered with sterile filter paper and seeded with an innoculum of *Pseudomonas aeruginosa*. The stainless steel coupons were left for 48 or 72 hours to develop biofilms of varying maturity. After 48 hours or 72 hours the coupons were removed and placed into test water containing the test biocide. After predetermined contact times (of the biocide with the coupon) the biofilm was removed from the coupon and the number of surviving bacteria was determined by a standard enumeration technique (referred to as the Most Probable Number (MPN) technique) for counting viable bacterial cells.

Results for a 72 hour biofilm

Product application details	Number of surviving bacteria
Control	$4x10^7$
150 ppm 75% THPS	$3.5x10^7$
300 ppm 75% THPS	$1.4x10^7$
150 ppm of 50% THPS/0.7% WSCP	8.5×10^6
300 ppm of 50% THPS/0.7% WSCP	2.5×10^4

Results for a 48 hour biofilm

Product Application Details	Number of surviving bacteria
Control	$4.4x10^6$
150 ppm 50% THPS/0.7% WSCP	Total Kill
150 ppm of 50% THPS/5% BAC	40

Points to note: WSCP is a 65% active polyquaternary ammonium compound; BAC (Benzalkonium Chloride) exhibits a severe foaming potential. The THPS/WSCP blend is totally non-foaming.

11. That in further experiments carried out under his supervision, the effect of a mixture according to the application in suit on a sample of bacterially-contaminated water was compared with the effect of a mixture containing a known surfactant biopenetrant. The details of said further experiments are as follows:

Product 1: A mixture of THPS (10% active) and WSCP2 (10% active) – (this is a mixture according to the application in suit);

Product 2: A mixture of THPS (35% active) and sodium lauryl sulphate (2%) – (this is a mixture of THPS and a known, effective, surfactant biopenetrant);

wherein: THPS = tetrakis (hydroxymethyl) phosphonium sulphate;

WSCP2 = the reaction product of tetramethyl-ethylene-diamine with hydrochloric acid and epichlorohydrin;

100p.p.m. of the product was dosed into WHO water inoculated with a standard General aerobic bacteria culture. A contact time of one hour was used. Following incubation, the reduction in bacteria was determined (as logarithmic reduction when compared to the original inoculated water).

The results obtained were as follows:

	Log reduction (after 1 hour)
Product 1	7.5
Product 2	6.1
WSCP2 alone	< 1

In summary, the above results signify that:

Product 1 (a mixture of THPS and a non-surfactant biopenetrant according to the present application) causes a 10-fold reduction of bacteria when compared to
Product 2 (a mixture of THPS and a surfactant biopenetrant);

and that WSCP2 alone has no appreciable effect on bacterial reduction, under these conditions.

The claimed mixture, therefore, has been shown to exhibit synergism when compared with mixtures containing surfactant biopenetrants.

The undersigned hereby declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made in the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of the Title 18 of the United States Code, and that such willful false statements may jeopardise the validity of the application or any patent issued thereon.

Signed Chris Jones

Christopher Raymond Jones

Date 6th December 2002